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Application No.: 10/752,384
Office Action Dated: January 25, 2007

PATENT
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PROCEDURE PURSUANT TO
37 CFR § 1.116

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Original) A system for searching web pages comprising:

   a database for storing connectivity information about the web pages; and

   a page-grading engine associated with an approximation matrix Q', where Q' approximates an ideal matrix Q with respect to the connectivity information; wherein the page-grading engine receives as input a personalization description v describing a set of preferences among the web pages, and grades search results with respect to Q' and v.

2. (Original) The system of claim 1 wherein approximation matrix Q' is a rank-k matrix whose representation comprises a singular value decomposition comprising matrices V_k, S and U_k^T for a parameter k.

3. (Original) The system of claim 2 wherein v is a vector and Q' times v is an optimal approximation to Q times v over all rank-k matrices.

4. (Currently Amended) A method of grading objects from an interconnected collection of weighted objects, the weights of the objects described by a description v, and the interconnection of the objects described by a description P, the method comprising:

   applying a grading function Q' to the description v for the objects to determine a set of grades for the objects; and

   assigning at least one object the corresponding determined grade for that object; wherein the grading function Q' approximates an ideal grading function Q, where applying ideal grading function Q to the description v produces ideal grades with respect to description P for every object in the interconnected collection of weighted objects

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rendering an indication of at least one graded object.

5.   (Original) The method of claim 4 wherein P, Q, and Q' are matrices, v is a vector, and the approximation is a low-rank optimal approximation.

6.   (Currently Amended) The method of claim 5 wherein entry P[i,j] in matrix P represents the probability of reaching one object i ~~fiom~~ from another object j in one step of a random walk among the weighted objects.

7.   (Original) The method of claim 6 wherein at each step of the random walk there is a fixed probability c that the walk will reset, and that the random walk then continues from object a with probability v[a].

8.   (Original) The method of claim 7 wherein the ideal grade of an object b is the probability of arriving at object b at a step of the random walk.

9.   (Original) The method of claim 5 wherein the objects are web pages.

10.   (Original) A method of grading objects from an interconnected collection of weighted objects by approximating a matrix Q with respect to a parameter k, comprising:

computing a matrix U_k;

computing a matrix V_k;

computing a diagonal matrix S;

defining the approximation to Q as the matrix product $V_k S U_k^T$; and

determining a grade for at least one of the objects using the approximation to Q;

wherein the weights of the objects are described by a vector v, the interconnection of

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the objects is described by a matrix P, and the ideal grade of object i with respect to matrix P equals Q[i] times v where Q[i] is the ith row of an ideal matrix Q.

11. (Original) The method of claim 10 further comprising:

choosing a sufficiently large parameter d; and

computing an intermediate matrix M with respect to P; wherein matrix $U_{k,}$, comprises the k principal eigenvectors of $dI - MM^T$ and matrix V_k comprises the k principal eigenvectors of $dI - M^T M$, and wherein matrix $S = (dI - D)^{-\frac{1}{2}}$, where D is the diagonal matrix comprising the k eigenvalues corresponding to the k principal eigenvectors of $dI - MM^T$.

12. (Original) The method of claim 11 wherein computing an intermediate matrix M with respect to P is further with respect to a constant c.

13. (Currently Amended) A system for grading objects from an interconnected collection of weighted objects comprising:

a description v of the weights of the objects;

a description P of the interconnection of the objects; and

a processor comprising an object-grading engine for approximating an ideal grading function Q with an approximate function Q', where applying ideal grading function Q to the description v produces ideal grades with respect to description P for every object in the interconnected collection of weighted objects, and for assigning at least one object the grade produced for that object by an application of Q' to v.

14. (Original) The system of claim 13 further comprising a search engine in connection with the object-grading engine, wherein the object-grading engine grades objects passed from the search engine.

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15. (Original) The system of claim 13 wherein the objects are web pages.

16. (Previously Presented)   A computer-readable storage medium including computer-executable instructions facilitating the grading of web pages, the web pages interconnected corresponding to a matrix P, computer-executable instructions executing the steps of:

   computing a representation of an approximation matrix Q' to an ideal matrix Q; and

   applying Q' to a personalization vector v to obtain grades of the web pages.

17. (Original) The computer-readable medium of claim 16 wherein Q' is a rank-k matrix whose representation comprises a singular value decomposition comprising matrices V_k, S and U_k^T for a parameter k.

18. (Original) The computer-readable medium of claim 17 wherein Q' times v is an optimal approximation to Q times v over all rank-k matrices.

19. (Original) The computer-readable medium of claim 17, the computer-executable instructions further executing the steps of:

   applying the grading of web pages produced by Q' to the results of a search query; and

   outputting the results of the search query sorted according the grading.